REMARKS

The application has been carefully reviewed in light of the Examiner's action dated September 25, 2007. Claims 1, 14, 25 and 30 have been amended. Reconsideration and full allowance are respectfully requested.

Initially, Applicant notes that the Examiner has rejected claims as being unpatentable over U.S. Pat. App. 2005/0047620 (hereinafter the Fretz Publication). The Fretz Publication has a filing date of September 1, 2004. The present application was filed on April 9, 2004, prior to the filing date of the Fretz Publication. The Fretz Publication is not, by itself, prior art. The Fretz Publication claims priority to a U.S. Provisional Application No. 60/499,755 (hereinafter referred to as the Provisional Application) filed on September 3, 2003. Applicant further notes that MPEP section 706.02(f)(1)(I)(B) provides that:

> The 35 U.S.C. 102(e) date of a reference that did not result from, nor claimed the benefit of, an international application is its earliest effective U.S. filing date, taking into consideration any proper benefit claims to prior U.S. applications under 35 U.S.C. 119(e) or 120 if the prior application(s) properly supports the subject matter used to make the rejection in compliance with 35 U.S.C. §112, first paragraph.

See also MPEP 2136.03(III). As such, Applicant respectfully submits that the Fretz Publication is not prior art to the present application except for the subject matter disclosed in the Provisional Application. Therefore, in the remarks that follow, Applicant makes reference to the subject matter disclosed in the Provisional Application. A copy of U.S. Provisional Application No. 60/499,755 will be provided at the Examiner's request.

In the Final Office Action, the Examiner rejected Claims 1-2, 9-14, 21-22, and 34-35 under 35 U.S.C. 103 as being anticipated by the Fretz Publication. As set forth below, all the claims are believed to be allowable as currently presented over the Fretz Provisional and the Fretz Publication, and therefore, this rejection is respectfully traversed. The above-noted claims include independent Claims 1, 14, and 25.

As presented, independent Claim 1 is directed to a method for reducing oscillation of a feedback signal in a hearing aid. The method includes determining a phase of a feedback signal over a feedback path of the hearing aid. The method further includes shifting the phase of an output signal of an implantable signal processor a predetermined amount, without modification of signal

gain characteristics, to achieve a non-zero net phase of the feedback signal over the feedback path. The method also includes applying the phase-shifted output signal to a transducer to stimulate a component of the auditory system of a patient.

As set forth in the application, it has been recognized that, in implanted hearing aid devices, feedback signals may be provided over different propagation paths to the microphone and amplifier, such as via the eardrum and middle ear canal or the bones and/or other parts of the skull. The feedback signals are re-amplified by the amplifier, which may create an undesirable oscillation. As set forth in the Background section of the application, in order to compensate for the feedback signals, a filter (e.g., an FIR filter) may be used to calculate the best set of filter coefficients for reactively lowering the gain or power of the feedback signal. This method has the disadvantage of limiting the actual output power available for the hearing aid, due to the fact that the closed loop gain should remain lower than 1 to avoid oscillation. Advantageously, the subject matter disclosed in Claim 1 proactively, as opposed to reactively, reduces the occurrence of oscillation of a feedback signal by shifting the phase of an output signal of an implantable signal processor a predetermined amount, and applying the phase-shifted output signal to a transducer, to achieve a non-zero net phase of the feedback signal over the feedback path. One specific advantage is that the system loop gain may be at levels at or above 1, without causing undesirable oscillation.

The Examiner asserted that the Fretz Publication discloses all the elements of Claim 1, except that the Fretz Publication does not disclose an implantable signal processor, and that it would have been obvious to add an implantable signal processor to the invention disclosed in the Fretz Publication. The Applicant agrees that the Fretz Publication does not disclose an implantable signal processor, but, for the reasons set forth below, disputes the Examiner's assertion that all the remaining elements of Claim 1 are disclosed.

In particular, the disclosure provided in the Fretz Provisional Application uses an FIR filter to provide an internal feedback path that compensates for the feedback signals. See page 7, lines 10-17. As discussed above, the FIR filter is used to calculate the best set of filter coefficients for reactively lowering the gain or power of the feedback signal. To determine the coefficients in the feedback FIR filter, the invention disclosed in the Provisional Application makes a small phase shift (using the phase shifter shown in Figure 2) in the forward path of the system "as a means to measure the feedback path." That is, the phase shift is introduced as a test signal so that the system can determine if oscillating signals are due to feedback signals, or other oscillatory signals such as

musical tones. See page 3, lines 1-3. A measurement of the phase shift is then used to determine whether there is feedback in the system. See page 3, lines 4-10, and Figure 2. Therefore, the Provisional Application does not disclose shifting the phase of an output signal of an implantable signal processor a predetermined amount, without modification of signal gain characteristics, to achieve a non-zero net phase of the feedback signal over the feedback path. Introducing a phase shift for this reason may be desirable to reduce the possibility of undesirable oscillations due to feedback signals having a zero net phase over the feedback path. In other words, the purpose for introducing a phase shift into the system disclosed in the Provisional Application is fundamentally different than the purpose in the present application.

The Provisional Application also fails to disclose shifting the phase of an output signal of an implantable signal processor a predetermined amount, without modification of signal gain characteristics, to achieve a non-zero net phase of the feedback signal over the feedback path. As shown in Figure 2 of the Provisional Application, the phase shifter that is introduced for measurement purposes is positioned at the input of the signal processor, whereas the phase shift disclosed in the method of Claim 1 is applied to an output signal of the signal processor. This distinction is significant because, as discussed above, phase shifting after processing to offset the feedback signal permits the system loop gain to be at a level at or above 1, without causing oscillation.

The Provisional Application also fails to disclose applying the phase-shifted output signal to a transducer to stimulate a component of the auditory system of a patient. As discussed above, a phase shift is applied at the input of the "Forward Path" shown in Figure 2 of the Provisional Application, rather than the output of a signal processor, as claimed in Claim 1. That is, the Fretz Provisional Application fails to disclose or suggest applying a phase-shifted output signal to the transducer.

In summary, the Fretz Provisional Application fails to disclose shifting the phase of an output signal of an implantable signal processor a predetermined amount, without modification of signal gain characteristics, to achieve a non-zero net phase of the feedback signal over the feedback path, and applying phase-shifted output signal to a transducer to stimulate a component of the auditory system of a patient. Accordingly, there is no 35 USC §112 support for these processes in the Fretz Publication. Therefore, Applicant submits that Claim 1 and its dependent claims are allowable over

both the Fretz Provisional Application and the Fretz Publication and respectfully requests that this rejection be withdrawn.

As presented, independent Claim 14 is directed to a method for reducing oscillation of a feedback signal over a feedback path in a hearing aid. The method includes monitoring the hearing aid for at least one of conditions favorable to oscillation of a feedback signal and oscillation of the feedback signal. The method also includes, responsive to detecting one of the conditions favorable for oscillation and oscillation of the feedback signal, determining the phase of the feedback signal. Furthermore, the method includes shifting the phase of an output signal of an implantable signal processor a predetermined amount, without modification of signal gain characteristics, to achieve a non-zero net phase of the feedback signal over the feedback path. The method further includes applying the phase-shifted output signal to a transducer to stimulate a component of the auditory system of a patient.

The Provisional Application fails to disclose or suggest the method claimed by Claim 14. As discussed above in relation to Claim 1, The Provisional Application does not disclose shifting the phase of an output signal of an implantable signal processor a predetermined amount, without modification of signal gain characteristics, to achieve a non-zero net phase of the feedback signal over the feedback path. Further the Provisional Application does not disclose applying the phase-shifted output signal to a transducer to stimulate a component of the auditory system of a patient Accordingly, as The Provisional Application does not disclose the method of Claim 14 there is no 35 USC §112 support for these processes in the Fretz Publication. Therefore, Applicant submits that Claim 14 and its dependent claims are allowable over both the Fretz Provisional Application and the Fretz Publication and respectfully requests that this rejection be withdrawn.

As presented, independent Claim 25 is directed to a hearing aid that includes a microphone to receive audio inputs and provide a response signal. The hearing aid also includes an implantable signal processor to process the response signal to generate a transducer drive signal, wherein a portion of one of the response signal and the transducer drive signal is received over a feedback path as a feedback signal. Furthermore, the hearing aid includes a transducer to utilize the transducer drive signal to stimulate a component of the auditory system. The hearing aid also includes phase shifter logic, disposed in a path between the implantable signal processor and the transducer, to shift the phase of an output signal of the implantable signal processor a predetermined amount, without

modification of signal gain characteristics, to achieve a non-zero net phase of the feedback signal over the feedback path.

As discussed above in relation to Claims 1 and 14, the Provisional Application fails to disclose shifting the phase of an output signal of an implantable signal processor a predetermined amount, without modification of signal gain characteristics, to achieve a non-zero net phase of the feedback signal over the feedback path. As shown in Figure 2 of the Provisional Application, the phase shifter that is introduced for measurement purposes is positioned at the input of the signal processor, whereas the phase shift disclosed in the method of Claim 25 is applied to an output signal of the signal processor (i.e., between the implantable signal processor and the transducer) for the purpose of achieving a non-zero net phase of the feedback signal over the feedback path. This distinction is significant because, as discussed above, phase shifting after processing to offset the feedback signal permits the system loop gain to be at a level at or above 1, without causing oscillation. Accordingly, as the Provisional Application fails to disclose phase shifter logic, disposed in a path between the implantable signal processor and the transducer, to shift the phase of an output signal of the implantable signal processor a predetermined amount, without modification of signal gain characteristics, to achieve a non-zero net phase of the feedback signal over the feedback path, Applicant submits that Claim 25 and its dependent claims are allowable and respectfully requests that this rejection be withdrawn.

Based upon the foregoing, Applicants believe that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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